Date: 13 April 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-D Areas - Full Protocol - Waste Site 116-D-6
Subject: Inorganics - Data Package No. H0766-RLN (SDG No. H07[illegible])

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0766-RLN prepared by RECRA LabNet (RLN). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0XP52	2/29/00	Soil	C	See note 1
B0XP53	2/29/00	Soil	C	See note 1
B0XP54	2/29/00	Soil	C	See note 1
B0XP55	2/29/00	Soil	C	See note 1
B0XP56	2/29/00	Soil	C	See note 1

1 - ICP metals by 6010B (barium, lead, and chromium); mercury by 7471A.

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals and 28 days for mercury.

All holding times were acceptable.

- **Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable (no action was taken in regard to the equipment blank (sample B0XP55).

Equipment Blanks

One equipment blank (B0XP55) was submitted for analysis. Barium, chromium and lead were detected in the equipment blank. All other equipment blank results were acceptable.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample

result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 30% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan TDLs or the CRDL if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. All analytes met the analyte specific TDL.

- **Completeness**

Data package No. H0766-RLN (SDG No. H0766) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0766	REVIEWER: TLI	DATE: 4/13/00	PAGE 1 OF 1
COMMENTS: No qualifiers assigned.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: BECHTEL-HANFORD																			
Laboratory: RECRA LabNet																			
Case	SDG: H0766																		
Sample Number		B0XP52		B0XP53		B0XP54		B0XP55		B0XP56									
Location		A1		A2		A2		A2		A3									
Remarks						Duplicate		E. Blank											
Sample Date		2/29/00		2/29/00		2/29/00		2/29/00		2/29/00									
Inorganics	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Barium, total		47.8		51.3		54.4		0.67		54.7									
Chromium, total	0.5	5.0		6.1		7.8		0.20		9.2									
Mercury, total	0.05	0.02	U	0.02	U	0.02	U	0.02	U	0.05									
Lead, total	2	3.5		3.1		3.6		0.30		3.8									

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 03/15/00

CLIENT: TNU-HANFORD B99-005 RECRA LOT #: 0003L638

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0XP52	Barium, Total	47.8	MG/KG	0.02	1.0
		Chromium, Total	5.0	MG/KG	0.06	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	3.5	MG/KG	0.24	1.0
-002	B0XP53	Barium, Total	51.3	MG/KG	0.02	1.0
		Chromium, Total	6.1	MG/KG	0.06	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	3.1	MG/KG	0.23	1.0
-003	B0XP54	Barium, Total	54.4	MG/KG	0.02	1.0
		Chromium, Total	7.8	MG/KG	0.06	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	3.6	MG/KG	0.23	1.0
-004	B0XP55	Barium, Total	0.67	MG/KG	0.02	1.0
		Chromium, Total	0.20	MG/KG	0.06	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	0.30	MG/KG	0.21	1.0
-005	B0XP56	Barium, Total	54.7	MG/KG	0.02	1.0
		Chromium, Total	9.2	MG/KG	0.06	1.0
		Mercury, Total	0.05	MG/KG	0.02	1.0
		Lead, Total	3.8	MG/KG	0.22	1.0

4/13/00

A-52

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

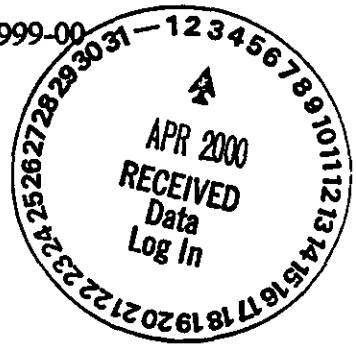
RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-005
RFW# : 0003L638
SDG/SAF# : H0766/B99-005

W.O.# : 10985-001-001-9999-00
Date Received: 03-03-00



METALS CASE NARRATIVE

1. This narrative covers the analyses of 5 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

3. All analyses were performed within the required holding times.

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. All preparation/method blanks (MB) were within method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. All matrix spike (MS) recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.

11. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

12. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

for Mark Schenkel
J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

3/02/00
Date

mld/m03-638

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-005-096	Page 1 of 2

Collector: Kerkow / Cowgill	Company Contact: RB Kerkow; Telephone No. 509-531-0635	Project Coordinator: TRENT, SJ	Price Code 8K; Data Turnaround 15 Days
Project Designation: 100 D Areas - Full Protocol	Sampling Location: 100-D (116-D-6 Deep zone)	SAF No. B99-005	Air Quality ☐
Ice Chest No. SM1552	Field Logbook No. EL-1339-6; COA R116D62600	Method of Shipment	
Shipped To: TMA/RECRA RECRA	Offsite Property No. A000134	Bill of Lading/Air Bill No. 42357953 4230	

POSSIBLE SAMPLE HAZARDS/REMARKS
Potentially Radioactive

Special Handling and/or Storage

Preservation			None	Cool 4C	None								
Type of Container			P	G	G/P								
No. of Container(s)				1	1								
Volume			1L	250mL	250mL								
SAMPLE ANALYSIS			See item (1) in Special Instructions. RBK 2/29/00	VOA - 8260A (TCL)	See item (2) in Special Instructions.						TIE TO		
Sample No.	Matrix *	Sample Date	Sample Time										
B0XP52	Soil	2-29-00	0930	DELETE	X	X				BOX9	RO	A1	
B0XP53	Soil	2-29-00	0945		X	X				BOX9	RO	A2	
B0XP54	Soil	2-29-00	0945		X	X				BOX9	RO	A2d	
B0XP55	Soil	2-29-00	0945		X	X				BOX9	RO	A2e	
B0XP56	Soil	2-29-00	1000		X	X				BOX9	RO	A3	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
JA Cowgill [signature]	2-29-00 1615	Refridge IC	2-29-00 1615
R IC	3-2-00/1130	R. Thoren [signature]	3-2-00/1130
R. Thoren [signature]	3-2-00/1430	FEDEX	
FedEx	3-3-00/0920	[signature]	3-3-00/0920

SPECIAL INSTRUCTIONS
Lab COA: R116D62F00

(1) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 -- Total Sr
(2) ICP Metals - 6010A (Supertrace) {Barium, Chromium, Lead}; Mercury - 7471 - (CV)

Matrix *
S=Soil
SE=Sediment
SO=Solid
S=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

0003638 temp. 3.2°

00000[illegible]

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100D 116-D-6			DATA PACKAGE: H0764		
VALIDATOR: TLI		LAB: RECRA		DATE: 4/6/00	
CASE:			SDG: H0764		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☒ SW-846/Hg	☐ SW-846 Cyanide	☐	☐
SAMPLES/MATRIX B0XP52	B0XP53	B0XP54	B0XP55		
B0XP56					
				soil	

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?	Yes	No	N/A
Are initial calibrations acceptable?	Yes	No	N/A
Are ICP interference checks acceptable?	Yes	No	N/A
Were ICV and CCV checks performed on all instruments?	Yes	No	N/A
Are ICV and CCV checks acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?	Yes	No	N/A
Are ICB and CCB results acceptable?	Yes	No	N/A
Were preparation blanks analyzed?	Yes	No	N/A
Are preparation blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments: B ✓ CR → SS − U Hg ✓ Pb SS − U
ok ok
SS − EB − Ba, CR, + Pb in EB

5. ACCURACY

Were spike samples analyzed?	Yes	No	N/A
Are spike sample recoveries acceptable?	Yes	No	N/A
Were laboratory control samples (LCS) analyzed?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	Yes	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	No	N/A
Were ICP serial dilution samples analyzed?	Yes	No	N/A
Are ICP serial dilution %D values acceptable?	Yes	No	N/A
Are field duplicate RPD values acceptable?	Yes	No	N/A
Are field split RPD values acceptable?	Yes	No	N/A

Comments:

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	N/A
Are duplicate injection %RSD values acceptable?	Yes	No	N/A
Were analytical spikes performed as required?	Yes	No	N/A
Are analytical spike recoveries acceptable?	Yes	No	N/A
Was MSA performed as required?	Yes	No	N/A
Are MSA results acceptable?	Yes	No	N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	Yes	No	N/A
Are all results supported in the raw data?	Yes	No	N/A
Are results calculated properly?	Yes	No	N/A
Do results meet the CRDLs?	Yes	No	N/A

Comments: No TDL for Barium

Date: 13 April 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-D Areas - Full Protocol - Waste Sites 116-D-6
Subject: Volatiles - Data Package No. H0766-RLN (SDG No. H0766)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0766-RLN prepared by Recra LabNet (RLN). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B0XP52	2/29/00	Soil	C	Volatiles by EPA 8260A
B0XP53	2/29/00	Soil	C	Volatiles by EPA 8260A
B0XP54	2/29/00	Soil	C	Volatiles by EPA 8260A
B0XP55	2/29/00	Soil	C	Volatiles by EPA 8260A
B0XP56	2/29/00	Soil	C	Volatiles by EPA 8260A

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times are assessed to ascertain whether the holding time requirements were met by the laboratory. Soil samples must be analyzed within 14 days of the date of sample collection for volatile organics. If holding times are exceeded, but not by greater than twice the limit, all associated sample

results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than twice the limit, all associated detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were met.

- **Blanks**

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples of a given matrix. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the TDL and is less than five times (or less than ten times for laboratory contaminants) the highest associated blank result, the sample result value is raised to the TDL, qualified as undetected and flagged "U".

Due to laboratory blank contamination, the methylene chloride results in all samples were raised to the TDL, qualified as undetected and flagged "U".

Due to laboratory blank contamination, the acetone results in all samples were raised to the TDL, qualified as undetected and flagged "U".

All other method blank results were acceptable.

- **Accuracy**

Matrix Spike/Matrix Spike Duplicate Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using the target compounds for which percent recoveries must be within established laboratory quality control limits. If spike recoveries are outside control limits (70-130%), detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control

limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All matrix spike/matrix spike duplicate recovery results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provides a measure of system performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory program. When a surrogate compound recovery is out of the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Undetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Samples with surrogate recoveries less than ten percent are qualified as estimates and flagged "J" for detects, and rejected and flagged "UR" for nondetects. Undetected compounds with surrogate recoveries greater than the upper control limit require no qualification. Surrogates are not required for formaldehyde analysis.

All surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. For samples analyzed using SW-846 protocol, results must be within RPD limits of +/- 30% for solid samples. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All precision results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the TDLs to ensure that laboratory detection levels meet the required criteria. The following were reported above the TDL in all samples except B0XP55: Chloromethane bromomethane, vinyl chloride, chloroethane, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone. Under the BHI validation SOW, no qualification is required. All other reported detection limits met their TDL.

- **Completeness**

Data package No. H0766-RLN (SDG No. H0766) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to laboratory blank contamination, the methylene chloride results in all samples were raised to the TDL, qualified as undetected and flagged "U". Due to laboratory blank contamination, the acetone results in all samples were raised to the TDL, qualified as undetected and flagged "U".

The following were reported above the TDL in all samples except B0XP55: Chloromethane bromomethane, vinyl chloride, chloroethane, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone. Under the BHI validation SOW, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validator in compliance with the BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0766	REVIEWER: TLI	DATE: 4/13/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Acetone, methylene chloride	U	All	Blank contamination

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

VOLATILE ORGANIC, ANALYSIS, SOIL MATRIX, (UG/KG)

Project: BECHTEL-HANFORD													
Laboratory: RECRA LabNet													
Case:	SDG: H0766												
Sample Number		B0XP52		B0XP53		B0XP54		B0XP55		B0XP56			
Location		A1		A2		A2		A2		A3			
Remarks						Duplicate		E. Blank					
Sample Date		2/29/99		2/29/99		2/29/99		2/29/99		2/29/99			
Analysis Date		03/13/00		03/13/00		03/13/00		03/13/00		03/13/00			
Volatile Organics	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chloromethane	10	11	U	11	U	11	U	10	U	11	U		
Bromomethane	10	11	U	11	U	11	U	10	U	11	U		
Vinyl Chloride	10	11	U	11	U	11	U	10	U	11	U		
Chloroethane	10	11	U	11	U	11	U	10	U	11	U		
Methylene Chloride	10	10	U	10	U	10	U	10	U	10	U		
Acetone	10	10	U	10	U	10	U	10	U	10	U		
Carbon Disulfide	10	6	U	6	U	6	U	5	U	6	U		
1,1-Dichloroethene	10	6	U	6	U	6	U	5	U	6	U		
1,1-Dichloroethane	10	6	U	6	U	6	U	5	U	6	U		
1,2-Dichloroethene (total)	10	6	U	6	U	6	U	5	U	6	U		
Chloroform	10	6	U	6	U	6	U	5	U	6	U		
1,2-Dichloroethane	10	6	U	6	U	6	U	5	U	6	U		
2-Butanone	10	11	U	11	U	11	U	10	U	11	U		
1,1,1-Trichloroethane	10	6	U	6	U	6	U	5	U	6	U		
Carbon Tetrachloride	10	6	U	6	U	6	U	5	U	6	U		
Bromodichloromethane	10	6	U	6	U	6	U	5	U	6	U		
1,2-Dichloropropane	10	6	U	6	U	6	U	5	U	6	U		
cis-1,3-Dichloropropene	10	6	U	6	U	6	U	5	U	6	U		
Trichloroethene	10	6	U	6	U	6	U	5	U	6	U		
Dibromochloromethane	10	6	U	6	U	6	U	5	U	6	U		
1,1,2-Trichloroethane	10	6	U	6	U	6	U	5	U	6	U		
Benzene	10	6	U	6	U	6	U	5	U	6	U		
trans-1,3-Dichloropropene	10	6	U	6	U	6	U	5	U	6	U		
Bromoform	10	6	U	6	U	6	U	5	U	6	U		
4-Methyl-2-pentanone	10	11	U	11	U	11	U	10	U	11	U		
2-Hexanone	10	11	U	11	U	11	U	10	U	11	U		
Tetrachloroethene	10	6	U	6	U	6	U	5	U	6	U		
1,1,2,2-Tetrachloroethane	10	6	U	6	U	6	U	5	U	6	U		
Toluene	10	6	U	6	U	6	U	5	U	6	U		
Chlorobenzene	10	6	U	6	U	6	U	5	U	6	U		
Ethylbenzene	10	6	U	6	U	6	U	5	U	6	U		
Styrene	10	6	U	6	U	6	U	5	U	6	U		
Xylenes (total)	10	6	U	6	U	6	U	5	U	6	U		

Recra LabNet - Lionville Laboratory
Volatiles by GC/MS, HSL List
Report Date: 03/20/00 14:03

RFW Batch Number: 0003L638 Client: TNU-HANFORD B99-005 Work Order: 10985001001 Page: 1a

	Cust ID:	B0XP52	B0XP53	B0XP54	B0XP55	B0XP56	B0XP56
Sample Information	RFW#:	001	002	003	004	005	005 MS
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.04	1.04	1.04	1.04	1.02	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate Recovery	Toluene-d8	92 %	98 %	99 %	102 %	94 %	93 %
	Bromofluorobenzene	89 %	94 %	91 %	93 %	94 %	87 %
	1,2-Dichloroethane-d4	119 %	109 %	105 %	101 %	120 %	114 %
Chloromethane		11 U	11 U	11 U	10 U	11 U	11 U
Bromomethane		11 U	11 U	11 U	10 U	11 U	11 U
Vinyl Chloride		11 U	11 U	11 U	10 U	11 U	11 U
Chloroethane		11 U	11 U	11 U	10 U	11 U	11 U
Methylene Chloride		9 B	9 B	10 B	7 B	9 B	9 B
Acetone		9 JB	8 JB	10 JB	7 JB	9 JB	9 JB
Carbon Disulfide		6 U	6 U	6 U	5 U	6 U	6 U
1,1-Dichloroethene		6 U	6 U	6 U	5 U	6 U	92 %
1,1-Dichloroethane		6 U	6 U	6 U	5 U	6 U	6 U
1,2-Dichloroethene (total)		6 U	6 U	6 U	5 U	6 U	6 U
Chloroform		6 U	6 U	6 U	5 U	6 U	6 U
1,2-Dichloroethane		6 U	6 U	6 U	5 U	6 U	6 U
2-Butanone		11 U	11 U	11 U	10 U	11 U	11 U
1,1,1-Trichloroethane		6 U	6 U	6 U	5 U	6 U	6 U
Carbon Tetrachloride		6 U	6 U	6 U	5 U	6 U	6 U
Bromodichloromethane		6 U	6 U	6 U	5 U	6 U	6 U
1,2-Dichloropropane		6 U	6 U	6 U	5 U	6 U	6 U
cis-1,3-Dichloropropene		6 U	6 U	6 U	5 U	6 U	6 U
Trichloroethene		6 U	6 U	6 U	5 U	6 U	98 %
Dibromochloromethane		6 U	6 U	6 U	5 U	6 U	6 U
1,1,2-Trichloroethane		6 U	6 U	6 U	5 U	6 U	6 U
Benzene		6 U	6 U	6 U	5 U	6 U	103 %
Trans-1,3-Dichloropropene		6 U	6 U	6 U	5 U	6 U	6 U
Bromoform		6 U	6 U	6 U	5 U	6 U	6 U
4-Methyl-2-pentanone		11 U	11 U	11 U	10 U	11 U	11 U
2-Hexanone		11 U	11 U	11 U	10 U	11 U	11 U
Tetrachloroethene		6 U	6 U	6 U	5 U	6 U	6 U
1,1,2,2-Tetrachloroethane		6 U	6 U	6 U	5 U	6 U	6 U
Toluene		6 U	6 U	6 U	5 U	6 U	104 %

*= Outside of EPA CLP QC limits.

Cust ID:	B0XP52	B0XP53	B0XP54	B0XP55	B0XP56	B0XP56
RFW#:	001	002	003	004	005	005 MS
Chlorobenzene	6 U	6 U	6 U	5 U	6 U	101 %
Ethylbenzene	6 U	6 U	6 U	5 U	6 U	6 U
Styrene	6 U	6 U	6 U	5 U	6 U	6 U
Xylene (total)	6 U	6 U	6 U	5 U	6 U	6 U

*= Outside of EPA CLP QC limits.

4/13/00 RR

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client: TNU-HANFORD B99-005
RFW #: 0003L638
SDG/SAF #: H0766/B99-005

W.O. #: 10985-001-001-9999-00
Date Received: 03-03-2000

GC/MS VOLATILE

Five (5) soil samples were collected on 02-29-2000.

The samples and their associated QC samples were analyzed according to criteria set forth in Recra OPs based on SW 846 Method 8260A for the client specified Volatile target compounds on 03-13-2000.

The following is a summary of the QC results accompanying these sample results and a description of any problems encountered during their analyses:

1. The cooler temperature upon receipt has been recorded on the chain-of-custody.
2. The required holding time for the analysis was met.
3. Non-target compounds were not detected in the samples.
4. All surrogate recoveries were within EPA QC limits.
5. All matrix spike recoveries were within EPA QC limits.
6. All blank spike recoveries were within EPA QC limits.
7. The method blank contained the common laboratory contaminants Methylene Chloride and Acetone at levels less than 2x the CRQL.

for J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

03-29-00
Date

som\group\data\voa\tnu-hanford-03-638.doc

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-005-096	Page 1 of 1

Collector: Kerkow / Cowgill	Company Contact: RB Kerkow — Telephone No. 509-531-0635	Project Coordinator: TRENT, SJ	Price Code 8K — Data Turnaround 15 Days
Project Designation: 100 D Areas - Full Protocol	Sampling Location: 100-D (116-D-6 Deep zone)	SAF No. B99-005	Air Quality ☐
Ice Chest No. SM1552	Field Logbook No. EL-1339-6 — COA R116D62600	Method of Shipment	
Shipped To: ~~TMA/RECRA~~ Recra	Offsite Property No. A000134	Bill of Lading/Air Bill No. 42357953 4230	

POSSIBLE SAMPLE HAZARDS/REMARKS
Potentially Radioactive

Special Handling and/or Storage

000015

Preservation		None	Cool 4C	None								
Type of Container		P	G	G/P								
No. of Container(s)		1	1	1								
Volume		1L	250mL	250mL								
SAMPLE ANALYSIS		See item (1) in Special Instructions. RBK 2/29/00	VOA - 8260A (TCL)	See item (2) in Special Instructions.						TIETO		

Sample No.	Matrix *	Sample Date	Sample Time											
B0XP52	Soil	2-29-00	0930	Deleted		X	X					BOX9	RO	A1
B0XP53	Soil	2-29-00	0945			X	X					BOX9	RO	A2
B0XP54	Soil	2-29-00	0945			X	X					BOX9	RO	A2d
B0XP55	Soil	2-29-00	0945			X	X					BOX9	RO	A2e
B0XP56	Soil	2-29-00	1000			X	X					BOX9	RO	A3

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
JA Cowgill / [illegible]	2-29-00 1615	Refridge IC	2-29-00 1615
Ref IC	3-2-00/1130	R. Thoren / R. Thoren	3-2-00/1130
R. Thoren / R. Thoren	3-2-00/1430	FedEx	
FedEx	3-3-00/0920	[illegible]	3-3-00/0920

SPECIAL INSTRUCTIONS
Lab COA: R116D62F00

(1) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 -- Total Sr
(2) ICP Metals - 6010A (Supertrace) {Barium, Chromium, Lead}; Mercury - 7471 - (CV)

Matrix *
S=Soil
SE=Sediment
SO=Solid
S=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

C0036038 temp. 3.2°

Appendix 5

Data Validation Supporting Documentation

Date: 13 April 2000
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-D Areas - Full Protocol - Waste Site 116-D-6
Subject: Radiochemistry - Data Package No. H0766-TNU (SDG No. H0766)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0766-TNU which was prepared by Thermo NUtech (TNU). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0XP52	2/29/00	Soil	C	See note 1
B0XP53	2/29/00	Soil	C	See note 1
B0XP54	2/29/00	Soil	C	See note 1
B0XP55	2/29/00	Soil	C	See note 1
B0XP56	2/29/00	Soil	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy (isotopic uranium, isotopic plutonium and americium-241); total strontium.

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

All holding times were acceptable.

- **Blanks**

Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

All blank results were acceptable although the TDL was exceeded for europium-155, uranium-235(gea) and uranium-238(gea).

Equipment Blanks

One equipment blank (B0XP55) was submitted for analysis. Uranium-233(aspec), uranium-238(aspec), potassium-40, radium-226, radium-228, thorium-228 and thorium-232 were detected in the equipment blank. All other equipment blank results were acceptable although the TDL was exceeded for europium-155, americium-241(gea), uranium-238(gea) and uranium-235(gea).

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery range is either 70-130% or ± 3 sigma. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

All accuracy results were acceptable.

- **Precision**

  Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

  Due to an RPD of 43%, all uranium-238(aspec) results were qualified as estimates and flagged "J".

  All other duplicate results were acceptable.

  Field Duplicate Sample

  One sample duplicate pair (B0XP53/B0XP54) was submitted for analysis. The samples were compared using the same criteria as for a laboratory duplicate. All field duplicate results were acceptable.

- **Detection Levels**

  Reported analytical detection levels for undetected analytes are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the contract specified MDA if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. The following analytes were reported above their TDL: Uranium-235(gea), uranium-238(gea) and europium-155 in all samples; americium-241(aspec) in samples B0XP52 and B0XP54; cobalt-60 in sample B0XP53; europium-154 in samples B0XP53, B0XP54 and B0XP56; and americium-241(gea) in samples B0XP54 and B0XP55. Under the BHI statement of work, no qualifcation is required. All other reported laboratory MDAs were at or below the analyte-specific TDL or contract specified MDA.

- **Completeness**

  Data Package No. H0766 (SDG No. H0766) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to an RPD of 43%, all uranium-238(aspec) results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The following analytes were reported above their TDL: Uranium-235(gea), uranium-238(gea) and europium-155 in all samples; americium-241(aspec) in samples B0XP52 and B0XP54; cobalt-60 in sample B0XP53; europium-154 in samples B0XP53, B0XP54 and B0XP56; and americium-241(gea) in samples B0XP54 and B0XP55. Under the BHI statement of work, no qualifcation is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0766	REVIEWER: TLI	DATE: 4/13/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Uranium-238(aspec)	J	All	RPD

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (PCi/G)

Project: BECHTEL-HANFORD																							
Laboratory: TNU																							
Case	SDG: H0766																						
Sample Number		B0XP52		B0XP53		B0XP54		B0XP55		B0XP56													
Location		A1		A2		A2		A2		A3													
Remarks						Duplicate		E. Blank															
Sample Date		2/29/00		2/29/00		2/29/00		2/29/00		2/29/00													
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q				
Uranium-233	0.1	0.415		0.346		0.332		0.333		0.512													
Uranium-235	0.1	0.042	U	0.015	U	0.081		0.012	U	0.016	U												
Uranium-238	0.1	0.425	J	0.384	J	0.340	J	0.328	J	0.408	J												
Plutonium-238	0.1	-0.015	U	0.052	U	0.031	U	-0.011	U	0	U												
Plutonium-239/40	0.1	0.024	U	0.038		0.027	U	-0.004	U	0.010	U												
Americium-241	0.1	0.088		0	U	-0.014	U	0.017	U	0.035	U												
Strontium (total)	1	-0.007	U	-0.043	U	0.118	U	-0.034	U	-0.020	U												
Potassium-40		11.8		11.2		12.8		3.24		13.5													
Cobalt 60	0.05	U	U	U	U	U	U	U	U	U	U												
Cesium 137	0.05	0.538		U	U	U	U	U	U	U	U												
Europium 152	0.1	2.87		U	U	U	U	U	U	0.074													
Europium 154	0.1	0.152		U	U	U	U	U	U	U	U												
Europium 155	0.05	U	U	U	U	U	U	U	U	U	U												
Radium-226		0.448		0.527		0.497		0.226		0.522													
Radium-228		0.776		0.828		0.788		0.353		0.904													
Thorium-228		0.640		0.906		0.702		0.252		0.788													
Thorium-232		0.776		0.828		0.788		0.353		0.904													
Americium-241 (GEA)	0.1	U	U	U	U	U	U	U	U	U	U												
Uranium-238 (GEA)	0.1	U	U	U	U	U	U	U	U	U	U												
Uranium-235 (GEA)	0.1	U	U	U	U	U	U	U	U	U	U												

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0766

R003024-01 B0XP52

DATA SHEET

SDG	7369	Client/Case no	Hanford SDG H0766
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R003024-01	Client sample id	B0XP52
Dept sample id	7369-001	Location/Matrix	100-D, 116-D-6 Deep Zone SOLID
Received	03/03/00	Collected	02/29/00 09:30
% solids	91.6	Custody/SAF No	B99-005-096 B99-005

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233	U-233/234	0.415	0.092	0.055	1.0	~~U~~	U
Uranium 235	15117-96-1	0.042	0.036	0.046	1.0	U	U
Uranium 238	U-238	0.425	0.092	0.038	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	-0.015	0.019	0.060	1.0	U	PU
Plutonium 239/240	PU-239/240	0.024	0.029	0.054	1.0	U	PU
Americium 241	14596-10-2	0.088	0.089	0.14	1.0	U	AM
Total Strontium	SR-RAD	-0.007	0.10	0.14	1.0	U	SR
Potassium 40	13966-00-2	11.8	0.76	0.36			GAM
Cobalt 60	10198-40-0	U		0.035	0.050	U	GAM
Cesium 137	10045-97-3	0.538	0.054	0.052	0.10		GAM
Europium 152	14683-23-9	2.87	0.11	0.089	0.10		GAM
Europium 154	15585-10-1	0.152	0.11	0.13	0.10		GAM
Europium 155	14391-16-3	U		0.093	0.10	U	GAM
Radium 226	13982-63-3	0.448	0.085	0.087	0.10		GAM
Radium 228	15262-20-1	0.776	0.19	0.19	0.20		GAM
Thorium 228	14274-82-9	0.640	0.042	0.048			GAM
Thorium 232	TH-232	0.776	0.19	0.19			GAM
Americium 241	14596-10-2	U		0.050		U	GAM
Uranium 238	U-238	U		5.4		U	GAM
Uranium 235	15117-96-1	U		0.14		U	GAM

100 D Areas - Full Protocol

4/13/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 03/17/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0766

R003024-02 B0XP53

DATA SHEET

SDG	7369	Client/Case no	Hanford SDG H0766
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R003024-02	Client sample id	B0XP53
Dept sample id	7369-002	Location/Matrix	100-D, 116-D-6 Deep Zone SOLID
Received	03/03/00	Collected	02/29/00 09:45
% solids	90.4	Custody/SAF No	B99-005-096 B99-005

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233	U-233/234	0.346	0.086	0.052	1.0	~~U~~	U
Uranium 235	15117-96-1	0.015	0.020	0.039	1.0	U	U
Uranium 238	U-238	0.384	0.086	0.032	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0.052	0.038	0.058	1.0	U	PU
Plutonium 239/240	PU-239/240	0.038	0.028	0.036	1.0	~~U~~	PU
Americium 241	14596-10-2	0	0.025	0.097	1.0	U	AM
Total Strontium	SR-RAD	-0.043	0.099	0.14	1.0	U	SR
Potassium 40	13966-00-2	11.2	0.98	0.34			GAM
Cobalt 60	10198-40-0	U		0.055	0.050	U	GAM
Cesium 137	10045-97-3	U		0.045	0.10	U	GAM
Europium 152	14683-23-9	U		0.10	0.10	U	GAM
Europium 154	15585-10-1	U		0.17	0.10	U	GAM
Europium 155	14391-16-3	U		0.083	0.10	U	GAM
Radium 226	13982-63-3	0.527	0.10	0.094	0.10		GAM
Radium 228	15262-20-1	0.828	0.26	0.23	0.20		GAM
Thorium 228	14274-82-9	0.906	0.083	0.075			GAM
Thorium 232	TH-232	0.828	0.26	0.23			GAM
Americium 241	14596-10-2	U		0.064		U	GAM
Uranium 238	U-238	U		5.9		U	GAM
Uranium 235	15117-96-1	U		0.14		U	GAM

100 D Areas - Full Protocol

4/13/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/17/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0766

R003024-03 B0XP54

DATA SHEET

SDG	7369	Client/Case no	Hanford SDG H0766
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R003024-03	Client sample id	B0XP54
Dept sample id	7369-003	Location/Matrix	100-D, 116-D-6 Deep Zone SOLID
Received	03/03/00	Collected	02/29/00 09:45
% solids	90.3	Custody/SAF No	B99-005-096 B99-005

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233	U-233/234	0.332	0.077	0.046	1.0	J	U
Uranium 235	15117-96-1	0.081	0.041	0.039	1.0	J	U
Uranium 238	U-238	0.340	0.077	0.052	1.0	J	U
Plutonium 238	13981-16-3	0.031	0.031	0.053	1.0	U	PU
Plutonium 239/240	PU-239/240	0.027	0.031	0.056	1.0	U	PU
Americium 241	14596-10-2	-0.014	0.068	0.14	1.0	U	AM
Total Strontium	SR-RAD	0.118	0.11	0.14	1.0	U	SR
Potassium 40	13966-00-2	12.8	0.64	0.24			GAM
Cobalt 60	10198-40-0	U		0.027	0.050	U	GAM
Cesium 137	10045-97-3	U		0.028	0.10	U	GAM
Europium 152	14683-23-9	U		0.069	0.10	U	GAM
Europium 154	15585-10-1	U		0.11	0.10	U	GAM
Europium 155	14391-16-3	U		0.083	0.10	U	GAM
Radium 226	13982-63-3	0.497	0.055	0.047	0.10		GAM
Radium 228	15262-20-1	0.788	0.16	0.14	0.20		GAM
Thorium 228	14274-82-9	0.702	0.040	0.034			GAM
Thorium 232	TH-232	0.788	0.16	0.14			GAM
Americium 241	14596-10-2	U		0.12		U	GAM
Uranium 238	U-238	U		3.6		U	GAM
Uranium 235	15117-96-1	U		0.11		U	GAM

100 D Areas - Full Protocol

4/13/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/17/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0766

R003024-04 B0XP55

DATA SHEET

SDG	7369	Client/Case no	Hanford SDG H0766
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R003024-04	Client sample id	B0XP55
Dept sample id	7369-004	Location/Matrix	100-D, 116-D-6 Deep Zone SOLID
Received	03/03/00	Collected	02/29/00 09:45
% solids	99.9	Custody/SAF No	B99-005-096 B99-005

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233	U-233/234	0.333	0.087	0.059	1.0	~~U~~	U
Uranium 235	15117-96-1	0.012	0.012	0.044	1.0	U	U
Uranium 238	U-238	0.328	0.078	0.036	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	-0.011	0.015	0.046	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.004	0.015	0.041	1.0	U	PU
Americium 241	14596-10-2	0.017	0.026	0.033	1.0	U	AM
Total Strontium	SR-RAD	-0.034	0.11	0.15	1.0	U	SR
Potassium 40	13966-00-2	3.24	0.44	0.24			GAM
Cobalt 60	10198-40-0	U		0.024	0.050	U	GAM
Cesium 137	10045-97-3	U		0.022	0.10	U	GAM
Europium 152	14683-23-9	U		0.059	0.10	U	GAM
Europium 154	15585-10-1	U		0.074	0.10	U	GAM
Europium 155	14391-16-3	U		0.087	0.10	U	GAM
Radium 226	13982-63-3	0.226	0.053	0.047	0.10		GAM
Radium 228	15262-20-1	0.353	0.12	0.099	0.20		GAM
Thorium 228	14274-82-9	0.262	0.031	0.032			GAM
Thorium 232	TH-232	0.353	0.12	0.099			GAM
Americium 241	14596-10-2	U		0.22		U	GAM
Uranium 238	U-238	U		3.5		U	GAM
Uranium 235	15117-96-1	U		0.11		U	GAM

100 D Areas - Full Protocol

4/13/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/17/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0766

R003024-05 B0XP56

DATA SHEET

SDG	7369	Client/Case no	Hanford SDG H0766
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R003024-05	Client sample id	B0XP56
Dept sample id	7369-005	Location/Matrix	100-D, 116-D-6 Deep Zone SOLID
Received	03/03/00	Collected	02/29/00 10:00
% solids	89.8	Custody/SAF No	B99-005-096 B99-005

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233	U-233/234	0.512	0.098	0.042	1.0	J	U
Uranium 235	15117-96-1	0.016	0.021	0.040	1.0	U	U
Uranium 238	U-238	0.408	0.088	0.033	1.0	J	U
Plutonium 238	13981-16-3	0	0.014	0.032	1.0	U	PU
Plutonium 239/240	PU-239/240	0.010	0.014	0.026	1.0	U	PU
Americium 241	14596-10-2	0.035	0.056	0.085	1.0	U	AM
Total Strontium	SR-RAD	-0.020	0.17	0.23	1.0	U	SR
Potassium 40	13966-00-2	13.5	0.87	0.40			GAM
Cobalt 60	10198-40-0	U		0.037	0.050	U	GAM
Cesium 137	10045-97-3	U		0.033	0.10	U	GAM
Europium 152	14683-23-9	0.074	0.045	0.073	0.10	J	GAM
Europium 154	15585-10-1	U		0.11	0.10	U	GAM
Europium 155	14391-16-3	U		0.079	0.10	U	GAM
Radium 226	13982-63-3	0.522	0.073	0.073	0.10		GAM
Radium 228	15262-20-1	0.904	0.17	0.16	0.20		GAM
Thorium 228	14274-82-9	0.788	0.042	0.035			GAM
Thorium 232	TH-232	0.904	0.17	0.16			GAM
Americium 241	14596-10-2	U		0.051		U	GAM
Uranium 238	U-238	U		4.6		U	GAM
Uranium 235	15117-96-1	U		0.16		U	GAM

100 D Areas - Full Protocol

4/13/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/17/00

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H0766 was composed of five solid (soil) samples designated under SAF No. B99-005 with a Project Designation of: 100 D Areas – Full Protocol.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Thermo Retec Sample Receipt Checklist. Results were transmitted to BHI via e-Fax on March 17, 2000.

2.0 ANALYSIS NOTES

2.1 Total Strontium Analyses

No problems were encountered during the course of the analyses.

2.2 Isotopic Uranium Analyses

No problems were encountered during the course of the analyses.

2.3 Isotopic Plutonium Analyses

No problems were encountered during the course of the analyses.

2.4 Americium-241 Analyses

No problems were encountered during the course of the analyses.

2.5 Gamma Spec Analyses

No problems were encountered during the course of the analyses.

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-005-096	Page 1 of 2

Collector: Kerkow / Cowgill	Company Contact: RB Kerkow — Telephone No.: 509-531-0635	Project Coordinator: TRENT, SJ	Price Code: 8K — Data Turnaround: 15 Days
Project Designation: 100 D Areas - Full Protocol	Sampling Location: 100-D (116-D-6 Deep zone) H0766 (7369)	SAF No.: B99-005	Air Quality ☐
Ice Chest No.: ERC99-074	Field Logbook No.: EL-1339-6 — COA: R116D62600	Method of Shipment	
Shipped To: TMA/RECRA EK 2/29/00	Offsite Property No.: A000142	Bill of Lading/Air Bill No.: 423579534240	

POSSIBLE SAMPLE HAZARDS/REMARKS
Potentially Radioactive

Special Handling and/or Storage

Preservation	None	Cool 4C	None									
Type of Container	P	G	GP									
No. of Container(s)	1	1	1									
Volume	1L	250mL	250mL									

SAMPLE ANALYSIS

				See item (1) in Special Instructions.	VOA - 8260A (TCL) RBK 2/29/00		See item (2) in Special Instructions. RBK 2/29/00					TIE TO		
Sample No.	Matrix *	Sample Date	Sample Time											
B0XP52	Soil	2-29-00	0930	X	DELETE		DELETE					B0X9	R0	A1
B0XP53	Soil	2-29-00	0945	X								B0X9	R0	A2
B0XP54	Soil	2-29-00	0945	X								B0X9	R0	A2d
B0XP55	Soil	2-29-00	0945	X								B0X9	R0	A2e
B0XP56	Soil	2-29-00	1000	X								B0X9	R0	A3

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
JA Cowgill / JAcowgill	2-29-00 1615	Refrig. IC	2-29-00 1615
Ref IC	3-2-00/1130	R.Thoren	3-2-00/1130
R.Thoren	3-2-00/1430	FEDEX	3-2-00
FedEx	3-3-00 10:00	TNV McGoldenberg	3-3-00

SPECIAL INSTRUCTIONS
Lab COA: R116D62F00

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 -- Total Sr
(2) ICP Metals - 6010A (Supertrace) (Barium, Chromium, Lead); Mercury - 7471 - (CV)

FAXED 3/3/00

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100D D6			DATA PACKAGE: H0746		
VALIDATOR: TV		LAB: TNU		DATE: 4/6/00	
CASE:			SDG: H0746		

ANALYSES PERFORMED

☐ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	☐		

SAMPLES/MATRIX					
B0XP52	B0XP53	B0XP54	B0XP55	B0XP56	
					Soil

1. Completeness . . . . . ☒ N/A

Technical verification forms present? . . . . . Yes No N/A

Comments: _____

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments: _____

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments:

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	(Yes)	No	N/A
Method blank results acceptable?	(Yes)	No	N/A
Analytes detected in method blank?	Yes	(No)	N/A
Field blank(s) analyzed?	(Yes)	No	N/A
Field blank results acceptable?	Yes	(No)	N/A
Analytes detected in field blank(s)?	(Yes)	No	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:

EB U233 U238 (as per) K40 Ra 226/228 Th 228/230

5. Matrix Spikes . . . . . ☒ N/A

Matrix spike analyzed?	Yes	No	N/A
Spike recoveries acceptable?	Yes	No	N/A
Spike source traceable?	Yes	No	N/A
Spike source expired?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments:

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed?	(Yes)	No	N/A
LCS recoveries acceptable?	(Yes)	No	N/A
LCS traceable?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added?	(Yes)	No	N/A
Chemical recovery acceptable?	(Yes)	No	N/A
Chemical carrier traceable?	Yes	No	(N/A)
Chemical carrier expired?	Yes	No	(N/A)
Transcription/Calculation errors?	Yes	No	(N/A)

Comments:

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed?	(Yes)	No	N/A
RPD Values Acceptable?	Yes	(No)	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: U238 (asm) 4390 J M

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed?	Yes	No	N/A
Field duplicate RPD values acceptable?	Yes	No	N/A
Field split sample(s) analyzed?	Yes	No	N/A
Field split RPD values acceptable?	Yes	No	N/A
Performance audit sample(s) analyzed?	Yes	No	N/A
Performance audit sample results acceptable?	Yes	No	N/A

Comments: 53/54

10. Holding Times

Are sample holding times acceptable?	Yes	No	N/A

Comments:

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses?	Yes	No	N/A
Results supported in raw data?	Yes	No	N/A
Results Acceptable?	Yes	No	N/A
Transcription/Calculation errors?	Yes	No	N/A
MDA's meet required detection limits?	Yes	No	N/A
Transcription/calculation errors?	Yes	No	N/A

Comments: Am241 (Aspm) S2+S4 C060-53 I54-53/54/56 I55-all
241pm- 54/55 U238(pm) all U234(pm) all

Duncan, Jeanette M

From: Ivey, Lyle E
Sent: Thursday, April 20, 2000 2:00 PM
To: Duncan, Jeanette M
Subject: 116-D-6 Validation Review

Jeanette,

I do not have time to review the 116-D-6 Validation. I trust that Rich and QA will review it adequately.

Thanks.

Lyle E. Ivey
372-9680

Data Package Review - RLW

H0766 Inorganics: Pg. 2, Preparation Blanks, Last paragraph; typo ("an" not "and"). The parenthetical clause here is not clear. Should the "no action" comment belong in the equipment blank section?

4/24/00

Volatiles: No comments

Radiochemistry: No comments.

W03090 Inorganics: No comments.

Radiochemistry: Need to reevaluate and revise detection level sections. The evaluations appear to have been made against the reported "results" not MDA values. For example most Eu-155 MDAs do not meet the criteria. Also please note that Quanterra routinely reports non-detect results greater than the reported MDA (most Eu-152 issues noted in this report fall into this category). This is an artifact of Quanterra's antiquated gamma spec software (two different subroutines are used for the "result" and "MDA" calcs). Please identify those cases where the MDA was technically met but that reported non-detect values are above the CRDL.

correct

Data validation results:			
Validator:	DWS		
Date:	4/25/2000		
Project:	100D full protocol waste site 116-D-6		
SAF			
SDGs:	HO766		
data package	**analysis**	**page**	**comment**
HO766-TNU	Rad	NA	No corrections needed
HO766-TNU	Inorganics	1	The first line of the table lists sample "B0X952", the correct sample number is B0XP52.
HO766-TNU	Inorganics	2	~~The third sentence under Preparation Blanks is~~ not complete, ~~suspect~~ the word "and" ~~should be "an"~~
HO766-TNU	volatiles	NA	no corrections needed

Review Comment Record (RCR)

1. Date	2. Review No.
04/18/00	QA-0025
3. Project	4. Page
100-D	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. H0766	100-D Full Protocol	Claude Stacey	Quality Program	372-9208

17. *Comment Submittal Approval:*

Organization Manager (Optional) / Date

18. *Agreement with indicated comment disposition(s)*

Reviewer/Point of Contact / Date

Author/Originator

11. CLOSED

05/03/00
Reviewer/Point of Contact / Date

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry: Page 10, sample B0XP52, Sr-Total has the result as -0.077 were as the lab report sheet shows the result as 0.007.		Correct K	
2	Inorganic: OK			
3	Volatiles: OK		4/24/00	